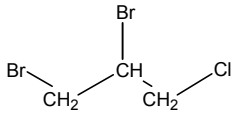
1,2-DIBROMO-3-CHLOROPROPANE
CAS No. 96-12-8
First Listed in the *Second Annual Report on Carcinogens*



CARCINOGENICITY

1,2-Dibromo-3-chloropropane is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC V.15, 1977; IARC V.20, 1979; NTP 206, 1982; IARC S.7, 1987). When administered by gavage, 1,2-dibromo-3-chloropropane induced squamous cell carcinomas of the forestomach in rats and mice of both sexes and carcinomas of the mammary gland in female rats (NCI 28, 1978). When exposure was by inhalation, 1,2-dibromo-3-chloropropane increased the incidences of adenocarcinomas and carcinomas or squamous cell carcinomas of the nasal cavity and squamous cell papillomas of the tongue in rats of both sexes, and adrenal cortical adenomas and squamous cell papillomas or carcinomas of the pharynx in female rats. When exposure was by inhalation, the compound increased the incidences of carcinomas and squamous cell carcinomas of the nasal cavity in male mice; carcinomas, adenocarcinomas, and squamous cell carcinomas of the nasal cavity in female mice; and alveolar/bronchiolar adenomas or carcinomas of the lung in mice of both sexes (NTP 206, 1982).

There are no adequate data available to evaluate the carcinogenicity of 1,2-dibromo-3-chloropropane in humans (IARC S.7, 1987). A cohort of chemical workers exposed to 1,2-dibromo-3-chloropropane and many other compounds showed a slight increase in mortality from all cancers, mainly respiratory. Another group of workers determined to have been exposed to 1,2-dibromo-3-chloropropane also showed a nonsignificant increase in mortality from cancer, especially lung cancer. Among another group of workers exposed to the compound on a routine basis, no cancer death was observed.

PROPERTIES

1,2-Dibromo-3-chloropropane is a dark amber to dark brown liquid (colorless when pure) with a pungent odor. It is slightly soluble in water and miscible in aliphatic and aromatic hydrocarbon solvents. Technical-grade 1,2-dibromo-3-chloropropane was available in the United States containing not less than 95% of the pure chemical. Commercial formulations included an emulsifiable concentrate containing 70.7-87.8%, a solution containing 47.2%, granules containing 5.25-34%, or fertilizer mixtures containing 0.6-5% 1,2-dibromo-3-chloropropane.

USE

EPA banned all uses of 1,2-dibromo-3-chloropropane in 1988 (EPA, 1998). Previously it was used as a pesticide that was registered by EPA as a soil fumigant to control nematodes during growth of field crops, vegetables, fruits and nuts, greenhouse and nursery crops, and turf. In 1977 EPA suspended all registrations for the use of products containing the compound except for use on pineapples in Hawaii; this exception was revoked in 1985. In 1977, 831,000 lb of 1,2-

dibromo-3-chloropropane were used in California alone, mainly on grapes and tomatoes. In 1974, U.S. farmers applied 9.8 million lb of 1,2-dibromo-3-chloropropane on crops (IARC V.20, 1979). 1,2-Dibromo-3-chloropropane is now used only as an intermediate in organic synthesis and for research purposes (ATSDR, 1992-R038).

PRODUCTION

1,2-Dibromo-3-chloropropane is no longer commercially manufactured in the United States (ATSDR, 1992-R038). *Chemcyclopedia 98* and the 1998 Chemical Buyers Directory indicated no current suppliers of the chemical (Rodnan, 1997; Tilton, 1997). In 1989, one supplier was listed for domestic research purposes (ATSDR, 1992-R038). For the late 1980s, Chem Sources International listed two domestic suppliers of 1,2-dibromo-3-chloropropane (Chem Sources International, 1988). The 1979 TSCA Inventory identified three companies producing 1,000 lb of 1,2-dibromo-3-chloropropane in 1977 and one importer, with no volume given. The CBI Aggregate was less than 1 million lb (TSCA, 1979). Estimates of annual production during 1974 and 1975 were 18 million to 20 million lb. 1,2-Dibromo-3-chloropropane was first produced commercially in the United States in 1955 (IARC V.20, 1979). Since its use as a fumigant and nematocide was cancelled, significant amounts of imports are unlikely. Exports, too, are negligible since the compound is not made in the United States (ATSDR, 1992-R038).

EXPOSURE

Widespread exposure of the general population and of workers to 1,2-dibromo-3-chloropropane is not likely since use of the chemical as a soil fumigant has been banned since 1985. Exposure of the general population to 1,2-dibromo-3-chloropropane may occur with ingestion of previously contaminated drinking water and food. Since the areas in which 1,2-dibromo-3-chloropropane was used as a soil fumigant were limited in size and number, and since 1,2-dibromo-3-chloropropane is moderately volatile and is degraded in moist soil, this type of exposure is probably minimal (IARC V.20, 1979; ATSDR, 1992-R038).

Due to a lack of recent comprehensive monitoring data, the average daily intake of 1,2-dibromo-3-chloropropane cannot be determined. A National Occupational Hazard Survey (NOHS) conducted for NIOSH between 1972 and 1974 estimated that 9,682 workers were exposed to 1,2-dibromo-3-chloropropane in 1972. These data, however, are no longer valid to predict current worker exposure because of the 1985 ban on the use of 1,2-dibromo-3-chloropropane as a soil fumigant and because it is likely that only small amounts are used for chemical synthesis and research purposes. 1,2-Dibromo-3-chloropropane was not included in the National Occupational Exposure Survey (NOES) conducted by NIOSH in 1983-1984 (ATSDR, 1992-R038).

REGULATIONS

EPA regulates 1,2-dibromo-3-chloropropane under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Resource Conservation and Recovery Act (RCRA), Superfund Amendments and Reauthorization Act (SARA), and Toxic Substances Control Act (TSCA). A reportable quantity (RQ) of 1 lb has been established for 1,2-dibromo-3-chloropropane under CERCLA. EPA unconditionally suspended all 1,2-dibromo-3-chloropropane-containing

products for end uses, except for use on pineapples in Hawaii, which was subsequently revoked. EPA further issued a notice of intent to cancel unconditionally all remaining end uses of all registered 1,2-dibromo-3-chloropropane-containing pesticide products. TSCA requires production and use data to be collected for potential exposure estimates. 1,2-Dibromo-3-chloropropane is designated as a hazardous constituent of waste under RCRA which requires report/recordkeeping on releases of the compound, whereas SARA placed it on the list of toxic chemicals subject to reporting requirements. EPA proposed a maximum contaminant level goal (MCLG) and a maximum contaminant level (MCL) for 1,2-dibromo-3-chloropropane and best available technology to achieve the MCL. FDA established maximum residue levels in raw milk and in all other raw agricultural commodities. NIOSH recommended that exposure be reduced to the lowest feasible concentration. OSHA established a permissible exposure limit (PEL) of 1 ppb (0.01 mg/m^3) as an 8-hr time-weighted average (TWA), and requires personal protective equipment, training, medical surveillance, signs and labeling, and engineering controls. OSHA also regulates 1,2-dibromo-3-chloropropane under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-37.